## REMARKS

The present invention is a transmitter for a portable radio communication apparatus and a subharmonic mixer. An embodiment of a transmitter for a portable radio communication apparatus includes a modulator as illustrated in Fig. 1 having a first port(s) RFP and RFN for inputting a baseband signal and a second port for inputting a local oscillator signal Lo, means for rectifying the local oscillator signal to provide a conductive wave format at a multiple of the local oscillator signal and means for mixing a baseband signal with the conductance waveform at a multiple of the local oscillator signal frequency for up-converting the baseband signal to a radio frequency modulated carrier, and means for controlling gain thereby to control the output level of the modulator. The switching means of the modulator comprises transistors Q1-Q4 with the transistors Q2 and Q3 functioning as a rectifier of the local oscillator Lo. The gain control is comprised of current controllers labelled current 1 and Current 2. See the top paragraph on page 8 for a description of the mixing which takes place at twice the local oscillator frequency.

The present invention provides up conversion of the baseband signal without employing a local oscillator at the carrier frequency with the output of the modulator being variable. See the top paragraph of page 4 of the specification. The local oscillator operates at the subharmonic of the transmitted signal frequency with the mixing being performed between the baseband signal and one of the harmonics of the local oscillator which insures that the harmonic is not generated in the transmitter. See the second paragraph on page 4 of the specification. Moreover, the local oscillator is highly isolated providing modulator control over a large range. See the third paragraph on page 4 of the specification.

It is therefore seen that the modulator employs subharmonic mixing in combination with gain control using a local oscillator which may be highly integrated. See the bottom of page 4 and the top of page 5 of the specification.

Claims 1-3 and 7-9 stand rejected under 35 U.S.C. §103 as being unpatentable over United States Patent 5,568,098 (Horie et al) in view of United States Patent 6,215,898 (Otaka). With respect to claims 1 and 7, the Examiner reasons as follows:

> As per claims I and 7, *Horie et* al. disclose a transmitter for a portable radio device comprising a modulator, including a switching circuit, having a first port for inputting a baseband signal and a second port for inputting a local oscillator signal to the switching circuit which provide a conductance waveform at a frequency multiple of the local oscillator signal for up-converting the baseband signal to a radio frequency modulated carrier (fig. 5, col. 3/In. 58-col. 4/In. 67).
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> *Horie et* al. do not explicitly disclose such controls the gain of the modular to control the output level of the modulator. However, such gain control method of the modulator is well known in the art, as disclosed by *Otaka* (fig. 6-10, col. 7/In. 29-col. 10/In. 48). Therefore, it would have been obvious to one of ordinary skill in the art to provide such method of gains control, as taught by *Otaka,* to the transmitter of *Hone et al* to control input amplitude signal at an optimum gain level while minimizing the reduction of the S/N ratio.

This ground of rejection is traversed for the following reasons.

Claim 1 recites:

> A transmitter for a portable radio communication apparatus comprising a modulator having a first port for inputting a baseband signal and a second port for inputting a local oscillator signal, and including means for rectifying the input local oscillator signal to provide a conductance waveform at a multiple of the local oscillator signal, and means for mixing the baseband signal with the conductance waveform at said multiple of the local oscillator signal frequency for up-converting the baseband signal to a radio frequency modulated carrier, the transmitter including means for controlling the gain of the modulator thereby' to control the output level of the modulator.

and claim 7 recites:

> A transmitter of a portable radio communication apparatus comprising:
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> a modulator including a switching circuit, a first port for input of a baseband signal and a second port for input of a local oscillator signal to the switching circuit which provides a conductance waveform at a frequency multiple of an oscillation frequency of the local oscillator signal, and a mixer which mixes the baseband signal with the conductance waveform at the frequency multiple of the local oscillator signal frequency for up-converting the baseband signal to a radio frequency modulated carrier, and a gain control, coupled to the modulator, which controls the gain of the modulator to control the output level of the modulator.

Claim 1 requires a modulator including means for rectifying the input local oscillator signal provided to a first port to provide a conductance waveform at a multiple of the local oscillator signal and means for mixing the baseband signal with the conductance waveform at said multiple of the local oscillator signal frequency for up-converting the baseband signal to a radio frequency modulated carrier which is not disclosed by Horie et al. Horie et al disclose in Fig. 5 a quadrature modulator 18 which modulates a carrier signal produced by a frequency multiplier 17 which is distinct from the modulator. Horie et al do not disclose the specifics of their quadrature modulator 18 and therefore do not correspond to the means for rectifying and the means for mixing the baseband signal with the conductance waveform which is recited in claim 1 as being produced by the means for rectifying.

As may be determined from analysis of column 3, lines 58 through column 4, line 67, of Horie et al to which the Examiner refers, an output oscillation signal SA from a frequency synthesizer 16 is frequency multiplied by the frequency multiplier 17 and modulated by the carrier modulator 18. However, the

aforementioned elements of claim 1 are not disclosed in the above-noted portion of Horie et al.

If the Examiner persists in the stated grounds of rejection, it is requested that he point out how he is interpreting Horie et al to disclose the claimed modulator, which in Horie et al must correspond to the quadrature modulator 18, to include the combination of means for rectifying and means for mixing which Applicant asserts has no counterpart in the quadrature modulator 18 in accordance with the disclosure of Horie et al.

Furthermore, the Examiner relies upon Otaka for disclosing the means for controlling the gain of the modulator thereby to control the output level of the modulator. It is seen from the recited function of the means for controlling gain that the means for controlling the gain of the modulator controls the output level of the modulator. Therefore, the means for controlling gain must be part of the modulator in order to control the output level of the modulator. It is further seen that the Otaka et al do not disclose a modulator with a gain control therein to control the output level of a signal of the modulator.

Accordingly, it is submitted that if the proposed combination of Horie et al and Otaka was made, that none of the aforementioned elements of claim 1 would be achieved since Horie et al do not disclose claimed means for rectifying and the means for mixing and Otaka does not disclose the transmitter including means for controlling the gain of the modulator thereby to control the output level of the modulator.

Moreover, the Examiner has not demonstrated on the record why a person of ordinary skill in the art would be motivated to make the proposed combination of

Horie et al and Otaka since the gain control of Otaka does not pertain to that of a modulator as recited in claim 1.

The rejection of claim 7 based on the combination of Horie et al and Otaka is similarly flawed. Claim 7 recites subject matter different than the means for rectifying by reciting a switching circuit which provides a transconductance waveform at a frequency multiple of an oscillator frequency of a local oscillator signal. Horie et al also do not disclose this subject matter.

Horie et al do not disclose a switching circuit that provides a conductance waveform at a frequency multiple of an oscillation frequency of the local oscillator signal and the mixer which mixes the baseband signal with the transconductance waveform at the frequency multiple of the local oscillator signal frequency for up-converting the baseband signal to a radio frequency modulated carrier for the same reasons as discussed above with respect to the deficiencies of Horie et al. Moreover, the claimed gain control, which is recited as part of the modulator, is similarly not taught by Otaka since Otaka does not disclose a gain control within a modulator as recited for the reasons stated above.

Claim 2 further limits claim 1 in reciting a local oscillator signal drives the modulator at a multiple of its frequency. The modulator of Horie et al is not described in terms of its internal structure and there is no basis why a person of ordinary skill in the art would consider Horie et al to disclose a local oscillator signal which drives the modulator at a multiple of its frequency.

Claim 3 further limits claim 1 in reciting the means for controlling the gain of the modulator comprises current control means. Claim 3 is patentable for the same reasons set forth above with respect to claim 1.

Claim 8 further limits claim 7 in reciting that the local oscillator signal drives the switching circuit at a multiple of a frequency of the local oscillator. As stated above, Horie et al do not disclose the claimed switching circuit and further do not disclose the relationship of the local oscillator driving a switching circuit at a multiple of the frequency of the local oscillator.

Claim 9 further limits claim 7 in reciting the gain control comprises a current control and is patentable for the same reasons set forth above with respect to claim 7.

Claims 4-6 and 10-12 stand rejected under 35 U.S.C. §103 as being unpatentable over Horie et al in view Otaka further in view of Hickman LTPs. The Examiner concedes with respect to claims 6 and 12 that Horie et al do not explicitly disclose the Lo being provided at an even multiplication, but concludes that "it is common knowledge in the art that the reference frequency generator is set to one of the Lo frequencies" and "it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the reference frequency generator at even multiplication in order to expand the communication system application..." The Examiner's assertions of what is known to a person of ordinary skill in the art are not sufficiently demonstrated in the record and are not based upon the citation of prior art. This rejection is traversed as being based upon impermissible hindsight without the citation of prior art.

Moreover, Hickman does not cure the deficiencies noted above with respect to the combination of Horie et al and Otaka. Accordingly, it is submitted that the rejection of claims 4-6 and 10-12 is erroneous and should be withdrawn.

Claims 1-3 and 7-9 stand rejected under 35 U.S.C. §103 as being unpatentable over United States Patent 6,658,237 (Rozenblit et al) in view of Otaka. With respect to claims 1 and 7, the Examiner reasons as follows:

> As per claims I and 7, *Rozenblit et* at disclose a transmitter for a portable radio device comprising a modulator, including a switching circuit, having a first port for inputting a baseband signal and a second port for inputting a local oscillator signal to the switching circuit which provide a conductance waveform at a frequency multiple of the local oscillator signal for up-converting the baseband signal to a radio frequency modulated carrier (fig. 6, col. 12/In. 15-col. 13/In. 54, col. 20/In. 36-47).
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> *Rozenblit et al.* do not explicitly disclose such controls the gain of the modular to control the output level of the modulator. However, such gain control method of the modulator is well known in the art, as disclosed by Otaka (fig. 6-10, col. 7/In. 29-col. 10/In. 48). Therefore, it would have been obvious to one of ordinary skill in the art to provide such method of gains control, as taught by *Otaka,* to the transmitter of *Rozenblit at al* to control input amplitude signal at an optimum gain level while minimizing the reduction of the S/N ratio.

This ground of rejection is traversed for the following reasons.

The Examiner erroneously concludes that Rozenblit et al discloses a transmitter including a switching circuit having a first port for inputting a baseband signal and a second port for inputting a local oscillator signal to the switching circuit which provide a conductance waveform frequency at a multiple of the local oscillator signal for up-converting the baseband signal to a radio frequency modulated carrier. What is disclosed in Fig. 6 does not describe the claimed switching circuit which provides a conductance waveform at a frequency multiple to the local oscillator signal for up-converting baseband signal to a radio frequency modulated carrier. If the Examiner persists in the stated grounds of rejection, it is requested that he point out specifically where the switching circuit and mixer with the claimed

function involving the frequency relationship is disclosed as recited in claim 7 and furthermore, where the claimed rectifying means and mixer as recited in claim 1, which Applicant asserts are not described in the referenced portions of Rozenblit et al regarding Fig. 6, may be found.

The deficiency of Otaka regarding a gain control and in a modulator has been described above and again is asserted with respect to the proposed combination of Rozenblit et al with Otaka.

Claims 4-6 and 10-12 stand rejected under 35 U.S.C. §103 as being unpatentable over Rozenblit et al in view of Otaka further in view of Hickman LTPs. The Examiner, in a manner similar to his discussion of Horie et al, concludes that Rozenblit et al do not explicitly disclose the Lo signal is provided at an even multiplication, but concludes that "it is common knowledge in the art that the reference frequency generator is set to one of the Lo frequencies" and "it would have been obvious to one of ordinary skill in the art at the time of the invention to provide the reference frequency generator at even multiplication in order to expand the communication system application..." The Examiner's assertions of what is known to a person of ordinary skill in the art are not sufficiently demonstrated in the record and are not based upon the citation of prior art. This rejection is traversed as being based upon impermissible hindsight without the citation of prior art.

The deficiencies of Hickman have been noted above and are reasserted herein. Specifically, the teachings of Hickman et al would not motivate a person of ordinary skill in the art to arrive at the subject matter of claims 4-6 and 10-12 given the deficiencies of the proposed combination of

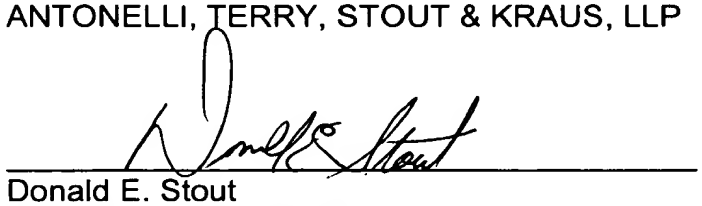
Rozenblit et al and Otaka not disclosing the claimed means for rectifying and means for mixing the baseband signal with the conductance waveform at said multiple of the local oscillator signal frequency for up-converting the baseband signal to a radio frequency modulated carrier as recited in claim 1 and a switching circuit which provides a conductance waveform at a frequency multiple of an oscillation frequency of the local oscillator signal and a mixer which mixes the baseband signal with the conductance waveform at the frequency multiple of the local oscillator signal frequency for up-converting the baseband signal to a radio frequency modulated carrier as recited in claim 7.

In view of the foregoing amendments and remarks, it is submitted that each of the claims in the application is in condition for allowance Accordingly, early allowance thereof is respectfully requested.

To the extent necessary, Applicants petition for an extension of time under 37 C.F.R. §1.136. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (367.38669X00) and please credit any excess fees to such Deposit Account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP



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